

MOLYBDENUM TRIOXIDE

CAS Registry Number: 1313-27-5

MoO₃

Molecular Formula: MoO₃

Molybdenum trioxide occurs as an odorless powder, or in granular or crystalline form. It is white, or slightly yellow to slightly bluish, depending on the temperatures. Molybdenum trioxide is sparingly soluble in water, very soluble in excess alkali (with formation of molybdates), and soluble in a concentrated mixture of nitric and sulfuric acids (Merck, 1989; Sax, 1989). Molybdenum trioxide readily combines with acids and bases to form a series of polymeric compounds (HSDB, 1993).

Physical Properties of Molybdenum Trioxide

Synonyms: molybdenum (VI) oxide; molybdic anhydride; molybdic trioxide; molybdena; molybdic acid hydride

Molecular Weight:	143.94
Boiling Point:	1,155 °C
Melting Point:	795 °C
Density/Specific Gravity:	4.696 at 26/4 °C

(HSDB, 1993; Merck, 1989; Sax, 1989)

SOURCES AND EMISSIONS

A. Sources

Molybdenum trioxide is primarily used in the manufacture of steel as an alloying agent. It is also used as a catalyst for the polymerization of olefins, as a corrosion inhibitor, as a catalyst in the petroleum industry and the manufacture of other chemicals, as a component of ceramics, enamels and pigments, and as a chemical intermediate for other molybdenum compounds (HSDB, 1993).

The primary sources of molybdenum trioxide emissions in California reported in the United States Environmental Protection Agency's (U.S. EPA) 1995 Toxics Release Inventory (TRI) Public Data Release Report were the chemical and allied products, petroleum and coal products, and primary metal industries (U.S. EPA, 1996b).

B. Emissions

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In California, approximately 440 pounds of molybdenum trioxide emissions were reported in the U.S. EPA 1995 TRI Public Data Release Report (U.S. EPA, 1996b).

C. Natural Occurrence

Soluble molybdate ions are present in trace concentrations in many surface waters as a product of natural weathering of molybdenum bearing soils. In soil, concentrations seem to vary between 0.1 and 10 milligrams per kilogram. Plant concentrations are dependent on the alkalinity of the soil and the amount of available molybdenum (HSDB, 1993).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements of molybdenum trioxide.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of molybdenum trioxide was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

Molybdenum trioxide is expected to be particle-associated in the atmosphere, and hence subject to wet and dry deposition. The average half-life and lifetime for particles and particle-associated chemicals in the troposphere is estimated to be about 3.5 to 10 days and 5 to 15 days, respectively (Balkanski et al., 1993; Atkinson, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Although molybdenum trioxide is reported as being emitted in California from stationary sources, no health values (cancer or non-cancer) are listed in the California Air Pollution Control Officers Association Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to molybdenum trioxide are inhalation, ingestion, and dermal contact.

Non-Cancer: Short-term exposure to molybdenum trioxide may result in irritation of the eyes, nose, throat, and skin. Inhalation exposure to metallic molybdenum and molybdenum trioxide may cause lung disease. Dusts of molybdenum trioxide are more toxic than fumes, and the trioxide is more toxic than the ore, metal, or molybdenum dioxide (HSDB, 1995). Animal studies have demonstrated exposure to high levels may result in anorexia and weight loss,

listlessness and muscular incoordination, coughing, hair loss, diarrhea, and liver and kidney damage (Sittig, 1991).

The U.S. EPA has not established a Reference Concentration (RfC) or oral Reference Dose (RfD) for exposure to molybdenum trioxide (U.S. EPA, 1995a).

Cancer: The International Agency for Research on Cancer and the U.S. EPA have not classified molybdenum trioxide as to its carcinogenic potential (U.S. EPA, 1995a).

